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Patent  
Case No.: 55250US002

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

First Named Inventor: BENSON, GERALD M.  
Application No.: 09/515978 Confirmation No.: 9164  
Filed: February 25, 2000 Group Art Unit 1794  
Title: A COMPOUND MOLD AND STRUCTURED SURFACE  
ARTICLES CONTAINING GEOMETRIC STRUCTURES WITH  
COMPOUND FACES AND METHOD OF MAKING SAME

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**BRIEF ON APPEAL**

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<b>CERTIFICATE OF MAILING OR TRANSMISSION [37 CFR § 1.8(a)]</b>	
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August 5, 2009	/Rebecca C. Bode/
Date	Signed by: Rebecca C. Bode

Dear Sir:

This is an appeal from the final Office Action mailed on March 16, 2009 finally rejecting claims 16-23 and 40.

**Fees**

- ☒ Any required fee under 37 CFR § 41.20(b)(2) will be made at the time of submission via EFS-Web. In the event fees are not or cannot be paid at the time of EFS-Web submission, please charge any fees under 37 CFR § 1.17 which may be required to Deposit Account No. 13-3723.
- ☐ Please charge any fees under 37 CFR §§ 37 CFR § 41.20(b)(2) and 1.17 which may be required to Deposit Account No. 13-3723.
- ☒ Please charge any additional fees associated with the prosecution of this application to Deposit Account No. 13-3723. This authorization includes the fee for any necessary extension of time under 37 CFR § 1.136(a). To the extent any such extension should become necessary, it is hereby requested.
- ☒ Please credit any overpayment to the same deposit account.

A Notice of Appeal in this application was transmitted to United States Patent and Trademark Office (“USPTO”) via the Office electronic filing system on June 5, 2009 and was received in the USPTO on June 5, 2009.

Appellants request the opportunity for a personal appearance before the Board of Appeals to argue the issues of this appeal. The fee for the personal appearance will be timely paid upon receipt of the Examiner’s Answer.

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**REAL PARTY IN INTEREST**

The real party in interest is 3M Company (formerly known as Minnesota Mining and Manufacturing Company) of St. Paul, Minnesota and its affiliate 3M Innovative Properties Company of St. Paul, Minnesota.

**RELATED APPEALS AND INTERFERENCES**

U.S. Patent Application No. 11/061,327 is a division of the present patent application and is on appeal (no appeal number assigned at this time). Both the present application and U.S. Patent Application No. 11/061,327 were rejected on the same grounds by the same Examiner.

The present application was previously appealed in Appeal No. 2007-2987. The Board's decision in this Appeal was rendered on November 30, 2007.

**STATUS OF CLAIMS**

Claims 9-14, 16-37, and 40 are pending. Claims 1-8, 15, 38, and 39 have been cancelled. Claims 9-14 and 24-37 are withdrawn. Claims 9-14, 16-37, and 40 stand rejected.

**STATUS OF AMENDMENTS**

No amendments have been filed after the final rejection.

**SUMMARY OF CLAIMED SUBJECT MATTER**

The subject matter of the pending application "relates generally to structured surfaces fabricated using microreplication techniques" (page 1, lines 9-10).

Independent claim 16 concerns a compound substrate (82, 236) comprising a replicated substrate (70, 214) having a structured surface (50, 100, 136, 290); a plurality of machined substrate pieces (28, 200) embedded in portions of the structured surface (50, 100, 136, 290); and a plurality of cube corner elements that each form a cube corner pyramid (56, 120, 134, 148, 296, 298) having a machined substrate piece (28, 200) embedded in a portion of the structured surface (50, 100, 136, 290) and that each have at least one compound face including a replicated substrate face and a machined substrate face.

Independent claim 20 concerns a compound substrate (82, 236), comprising: a replicated substrate (70, 214) and a machined substrate (28, 200), the replicated substrate (70, 214) having

a structured surface (50, 100, 136, 290) and a plurality of discrete pieces of the machined substrate (28, 200) embedded in the structured surface (50, 100, 136, 290); each of the replicated (70, 214) and machined substrates (28, 200) having an exposed surface that defines a compound face.

Independent claim 40 concerns a compound substrate (82, 236), comprising: a structured surface (50, 100, 136, 290) including a replicated substrate portion (70, 214) and a machined substrate portion (28, 200) embedded in the replicated substrate portion (70, 214), the compound substrate (82, 236) further comprising at least one compound face including a substantially planar surface having a first face portion on the machined substrate portion (28, 200) of the compound substrate and a second face portion on the replicated substrate portion (70, 214) of the compound substrate, the first and second face portions being on opposite sides of a transition line (130, 144).

### **Ground of Rejection to be Reviewed on Appeal**

Claims 16-23 and 40 stand rejected under 35 U.S.C. § 102(b) as purportedly anticipated by U.S. Patent No. 5,657,162 to Nilsen et al. (“Nilsen”).

### **ARGUMENT**

#### **Issue on Appeal**

The issue on appeal is the meaning and scope of the word “embedded” as used in the pending independent claims. Applicant asserts that the word “embed” is defined by The American Heritage® Dictionary of the English Language (Fourth Edition 2000) as “[t]o fix firmly in a surrounding mass.” Applicant then asserts that Nilsen neither describes nor shows discrete pieces that are fixed firmly *in a surrounding mass*. Instead, Nilsen only shows at FIG. 2 and describes at col. 2, lines 64-65 forming “transparent reflective metallic deposits *on the surface of* the microprism formations” (emphasis added). As such, Nilsen does not teach, describe, or suggest a machined portion embedded *in* a replicated portion, as is recited in independent claims 16, 20, and 40, as amended, or of their respective dependent claims. Consequently, Nilsen does not anticipate these claims.

In contrast, the Examiner first asserts that she “interprets ‘embed’ to merely mean to make something an integral part, see Merriam-Webster on-line dictionary.” Office Action, page 3. Using this definition of the word “embed,” the Examiner finds that because the coatings of Nilsen are an integral part of the structure of Nilsen, Nilsen anticipates the pending independent claims. *Id.* Second, the Examiner asserts that even if embed means “to fix firmly in a surrounding mass,” the coatings of Nilsen are fixed firmly in a surrounding mass, and thus Nilsen anticipates the pending independent claims. *Id.*

For these reasons, the basic issue on appeal is whether there is a difference between pieces fixed firmly in a surrounding mass and a coating that is deposited only on the surface. Appellant asserts that there is a significant difference; the Examiner seems to suggest that there is no difference.

#### Short Summary of the Pending Application

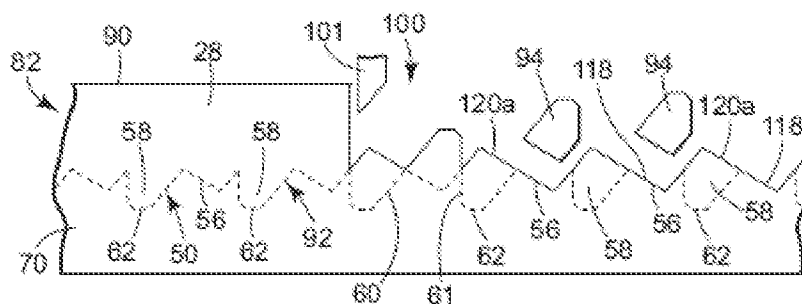
In order to better understand the pending independent claim of the present application, applicant provides the following short summary. The present application generally relates to a novel and inventive compound substrate, which is defined as “a substrate formed from a machined substrate having a structured surface and a replicated substrate . . . bonded along at least a portion of the interface with the machined substrate.” Page 26, lines 19-22. Reviewing one exemplary method of forming a compound substrate is helpful in understanding the structure of a compound substrate. One exemplary method as described in the present application involves:

- (1) obtaining a blank (for example blank 22 shown in Fig. 2) (see, *e.g.*, page 8, lines 5-29);
- (2) machining the blank 22, for example as shown in Fig. 4, to form a machined substrate 28, for example, as shown in Fig. 5, (see, *e.g.*, page 9, line 1 – page 10, line 20);
- (3) passivating the machined substrate 28 by, for example, applying a release layer or modifying the structured surface 50 to permit separation of a subsequent replicated substrate (see, *e.g.*, page 10, line 21 – page 11, line 4);
- (4) forming a replicated substrate 70 over the machined substrate 28 (as is shown in Figs. 6 and 6a) such that “[p]ortions of the replicated substrate 70 protrude into the machined substrate

28 to form a compound substrate 82 (see also Fig. 9)” (page 11, lines 14-16; *see also* page 11, lines 5 – 20); and

(5) machining the back surface 90 of the machined substrate 28 to form compound substrate 82, for example as shown in Fig. 9 (see, *e.g.*, page 11, line 21 – page 12, line 5 and page 12, line 26 - page 13, line 8).

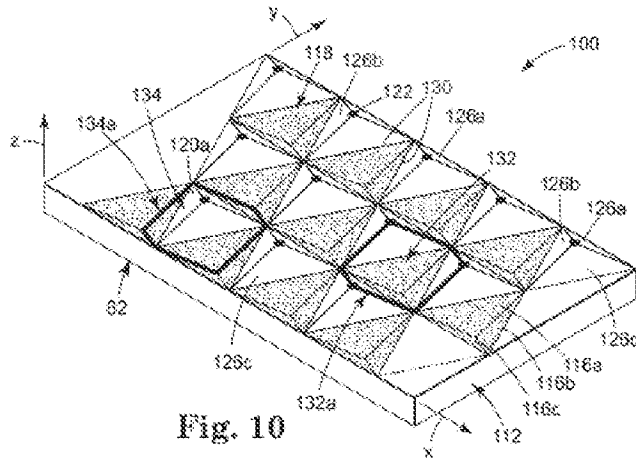
Fig. 9 (reproduced below) is a schematic illustration of the resulting compound substrate (82) in which a replicated substrate (70) is bonded along at least a portion of the interface with the machined substrate (28).



**Fig. 9**

As is shown in Fig. 9, compound substrate 82 “comprises the machined substrate 28 and the un-separated replicated substrate 70. The interface 92 between the structured surface 50 [of machined substrate 28] and the replicated substrate 70 is indicated by dashed line.” Page 12, lines 19-22. After the machining step is complete, “waste portions 94 of the machined substrate 28 fall away or are removed, leaving a cube corner cavity 118 in the replicated substrate 70.” Page 13, lines 9-11. “The distal ends or top surfaces 62 of the discrete pieces or protrusions 58 from the machined substrate 28 are bonded to the replicated substrate 70. Bottom or proximal portions of the protrusions 58 are machined to form cube corner pyramids 120a. The protrusions 58 on the machined substrate 28 remain embedded in the replicated substrate 70. Once all of the waste portions 94 of the machined substrate 28 are removed from the replicated substrate 70, the cube corner pyramids 120a [from the machined substrate 28] and cube corner cavities 118 [from the replicated substrate 70] form a geometric structured surface 100 with an array of PG cube corner elements.” Page 13, lines 13-20 (emphasis added).

Fig. 10 (reproduced below) is a view of geometric structured surface 100 on compound substrate 82 after all groove side surfaces have been formed and all waste portions 94 have been removed.



“Each of the cube corner cavities 118 has three replicated faces 116a, 116b, 116c and each of the cube corner pyramids 120a has three machined faces 126a, 126b, 126c, configured approximately mutually perpendicular to each other.” Page 13, lines 22-25. “Each of the three faces 126a-c of the cube corner pyramids 120a are machined to be substantially aligned with the nearest face 116 of an adjacent cube corner cavity 118. Consequently, each new cube corner cavity 132 comprising one replicated cube corner cavity 118 and one machined face 126 from each of its neighboring geometric structures 120a. Reference numeral 132a shows in bold outline one such cube corner cavity 132. A given face of one of the cube corner cavities 132 comprises one face of a cube corner cavity 118 formed in the replicated substrate 70 and one of the faces 126a, 126b, or 126c machined in the machined substrate 28. . . . [F]aces 116 of the cube corner cavity 118 are machined in the replicated substrate 70. Therefore, each cube corner cavity 132 comprises a compound face made up of a portion substantially formed or replicated in the replicated substrate 70 and a portion machined in the machined substrate 28 separated by a transition line 130. The transition lines 130 lie along the boundary or interface between the machined substrate 28 and the replicated substrate 70.” Page 14, lines 3-16.

#### Discussion of Nilsen

Nilsen generally relates to “retroreflective sheeting and articles in which the size of the

retroreflective and non-retroreflective surfaces may be varied across an array of microprisms. . . by varying the locations of the reflective coating applied to the microprism side facets, such that, some prism side facets are completely coated with reflective material while others are coated only at the apex area; and still others are coated with a non-reflective coatings [sic], such as, a colored adhesive.” Abstract. Fig. 2 of Nilsen (reproduced below) shows metallic deposits 30A and 30B applied on cured fluid resin 26.

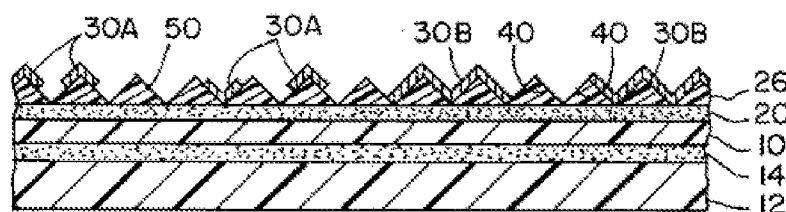


FIG. 2

Nilson only describes forming “transparent reflective metallic deposits on the surface of the microprism formations” (col. 2, lines 64-65 (emphasis added)).

#### Summary of Final Office Action

Claims 16-23 and 40 stand rejected as purportedly anticipated under 35 U.S.C. § 102(b) by U.S. Patent No. 5,657,162 to Nilson et al. (“Nilson”). The Examiner states that “[a]pplicant argues that Nilson [sic] does not disclose ‘a plurality of machined substrate pieces embedded in portions of the structured surface.’” Office Action, page 3. The Examiner then argues that Nilson [sic] describes ‘a plurality of machined substrate pieces embedded in portions of the structured surface.’” Specifically, the Examiner points to metallic deposits 30a of Nilson as describing machined substrate pieces embedded in portions of the structured surface. To support her argument, the Examiner first states that she “interprets ‘embed’ to merely mean to make something an integral part, see Merriam-Webster on-line dictionary.” *Id.* Second, the Examiner asserts that “Applicant’s machined substrate portion is embedded, ‘fix[ed] firmly in a surrounding mass,’ in [the same] sense that Nielsen’s [sic] coating is fix [sic] firmly in a surrounding mass on the surface of the microprism formations.” *Id.* Third, the Examiner asserts that “the replicated substrate and machined substrate are only bonded together with [sic] creates an

interface. There is no description in the specification that the machined substrate is every [sic] more then [sic] surface bonded to the replicated substrate.” Office Action, page 4.

### The Correct Definition of the Word “Embedded” in the Pending Claims

First, appellant asserts that the correct definition of the word “embedded” as used in the pending independent claims is “[t]o fix firmly in a surrounding mass,” as provided in The American Heritage® Dictionary of the English Language (Fourth Edition 2000). Appellant directs the Board’s attention to the fact that the Board of Patent Appeals and Interferences recently defined the word “embedded” in exactly this manner in *Ex parte Owens and Wyman*, Appeal No. 2008-4654, page 11 FN2 (January 12, 2009).<sup>1</sup> The definition adopted by the Board of Patent Appeals and Interferences in *Ex parte Owens and Wyman* is consistent with the description of the compound substrate in the pending application; the word “embed” or “embedded” is used three times in the specification and every use is consistent with the Board of Patent Appeals and Interferences’ previous ruling. Further, the Figures of the present application are consistent with the Board of Patent Appeals and Interferences’ previous ruling. For all of these reasons, Appellant urges this Board to follow its predecessor Board’s ruling.

Applicant next responds to the Examiner’s argument that the word “embed” in the pending claims means “to make something an integral part.” The Examiner cites the Merriam-Webster OnLine Dictionary for support for this definition. Office Action, page 3. Notably, the Examiner cites the second definition given by the Merriam-Webster OnLine Dictionary rather than the first definition. The first definition is “to enclose closely in or as if in a matrix.” Like appellant’s proffered definition, this first definition provided by the Merriam-Webster OnLine Dictionary supports appellant’s argument that, in order to be embedded, at least a portion of something must be *enclosed in* something else, as is the case in the appellant’s claimed compound substrate. In contrast, the metallic deposits of Nilsen are, by Nilsen’s own admission, merely *coated on the surface of* the microprisms and are not enclosed in anything.

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<sup>1</sup> In this decision, the Board of Patent Appeals and Interferences also found that the word “embedded” covered an embodiment in which a portion of material is exposed such that not all of the material is in a surrounding mass. *Id.* at pages 10-11.

Consequently, appellant asserts that the Examiner has not provided sufficient reason for adoption of a definition that is in contrast to the definition espoused by the Board of Patent Appeals and Interferences, that is the second proffered definition, and that is in conflict with the specification and figures of the present application. As such, appellant urges this Board not to adopt the Examiner's proffered definition of the word "embed."

Appellant further directs the Board to the case of *In re Engle* in which the Court of Customs and Patent Appeals held that although "[i]t is true that the term 'embed' is sometimes used with the meaning given to it by the Solicitor . . . [t]hat is the meaning 'lying upon,' . . . [i]t is quite obvious that the word 'embedded' should be given the meaning which . . . is contended by appellant should apply here; namely that the head of the actuating pin was surrounded by the rubber substance of the value." 23 C.C.P.A. 1203, 1205-1206, 83 F.2d 922, 923 (1936). The Court in this case also noted that "[t]he appellant argues that this feature is important." *Id.* Similarly, appellant argues that the word "embed" is important in the present claims, as it is at least one of the features that differentiate the novel and inventive compound substrate from any prior art substrate. Appellant also refers to the Board to the following additional cases whose findings regarding the definition of the word "embed" are consistent with the definition asserted by appellant: *Application of Leshin*, 47 C.C.P.A. 909, 277 F.2d 197 (1960); and *In re Jones*, 31 C.C.P.A. 848, 140 F.2d 159 (1944).

#### An Assessment of Whether Nilsen Describes an Embedded Component

The Examiner must find structural correspondence between the claim elements and the prior art in order to establish anticipation. Applicant respectfully asserts that the Examiner has failed to do so. Independent claim 16 recites, in pertinent part, "a plurality of machined substrate pieces embedded in portions of the structured surface" and "a plurality of cube corner elements that each form a cube corner pyramid having a machined substrate piece embedded in a portion of the structured surface." Independent claim 20 recites, in pertinent part, "a plurality of discrete pieces of the machined substrate embedded in the structured surface." Independent claim 40 recites, in pertinent part, "a machined substrate portion embedded in the replicated substrate portion." For at least the reasons argued above, the word "embedded" as used in the pending independent claims means "[t]o fix firmly in a surrounding mass." In contrast, the metallic

deposits of Nilsen are, by Nilsen's own admission, merely *coated on the surface of* the microprisms and are not embedded (see, *e.g.*, FIG. 2 and col. 2, lines 64-65 of Nilsen). Consequently, the Examiner has failed to make a prima facie case that the pending independent claims and their respective dependent claims are anticipated by Nilsen.

### Conclusion

For at least the above reason, appellant submits that Nilsen does not anticipate independent claims 16, 20, or 40. Because dependent claims 17-19 and 21-23 include additional claim elements, appellant asserts that, for the reasons above, claims 17-19 and 21-23 are not anticipated by Nilsen. Accordingly, appellant respectfully asserts that the above rejection of claims 16-23 and 40 should be reversed.

### CONCLUSION

For the foregoing reasons, appellants respectfully submit that the Examiner has erred in rejecting this application. Please reverse the Examiner on all counts.

Respectfully submitted,

August 5, 2009

Date

By: /Sandra K. Nowak/

Sandra K. Nowak, Reg. No.: 53,666

Telephone No.: 651-733-1543

Office of Intellectual Property Counsel  
3M Innovative Properties Company  
Facsimile No.: 651-736-3833

**CLAIMS APPENDIX**

1-8 (Cancelled).

9. (Withdrawn) A mold comprising a plurality of geometric structures set forth in claim 1.

10. (Withdrawn) The mold of claim 9, wherein the plurality of geometric structures comprise a plurality of cube corner elements.

11. (Withdrawn) The mold of claim 10, wherein at least some of the plurality of cube corner elements are PG cube corner elements.

12. (Withdrawn) The mold of claim 10, wherein the plurality of cube corner elements are part of a structured surface that comprises cavities formed in the replicated substrate and pyramids formed at least in part on the machined substrate.

13. (Withdrawn) The mold of claim 10, wherein at least some of the cube corner elements are arranged in opposing orientations.

14. (Withdrawn) The mold of claim 10, wherein at least some of the cube corner elements are canted and form matched pairs of cube corner elements.

15 (Cancelled).

16. (Previously Presented) A compound substrate, comprising:  
a replicated substrate having a structured surface;  
a plurality of machined substrate pieces embedded in portions of the structured surface;  
and

a plurality of cube corner elements that each form a cube corner pyramid having a machined substrate piece embedded in a portion of the structured surface and that each have at least one compound face including a replicated substrate face and a machined substrate face.

17. (Previously Presented) The substrate of claim 16, wherein the plurality of cube corner elements each have a cube height of no greater than about 1 mm and the replicated substrate face and machined substrate face are disposed on opposite sides of a transition line that is nonparallel to a dihedral edge of the cube corner element.

18. (Previously Presented) The substrate of claim 16, wherein the replicated substrate face and machined substrate face are disposed on opposite sides of a transition line, wherein substantially all transition lines are parallel to a reference plane.

19. (Previously Presented) The substrate of claim 16, wherein the cube corner element has an outline in plan view selected from the group of shapes consisting of a hexagon and a quadrilateral.

20. (Previously Presented) A compound substrate, comprising:  
a replicated substrate and a machined substrate, the replicated substrate having a structured surface and a plurality of discrete pieces of the machined substrate embedded in the structured surface; each of the replicated and machined substrates having an exposed surface that defines a compound face.

21. (Previously Presented) The compound substrate of claim 20, wherein the structured surface of the replicated substrate includes cavities and the discrete pieces of the machined substrate comprise a plurality of pyramids that are adjacent to the cavities.

22. (Original) The compound substrate of claim 21, wherein the pyramids and cavities form cube corner elements that have associated therewith a symmetrical entrance angularity.

23. (Original) A cube corner article made by at least one replication from the substrate of claim 20.

24. (Withdrawn) A method of making a geometric structure in an article, comprising the steps of:

providing a compound substrate having a structured surface formed along an internal interface between two substrates; and

forming grooved side surfaces in an exposed surface of the compound substrate to form a geometric structure, the geometric structure comprising a portion of the internal interface and a portion of the grooved side surfaces.

25. (Withdrawn) The method of claim 24, wherein the geometric structure comprises one of a cube corner element or a PG cube corner element.

26. (Withdrawn) The method of claim 24, wherein the providing step comprises the steps of:

passivating a surface of at least one of the two substrates; and  
selectively removing portions of the passivated surface.

27. (Withdrawn) The method of claim 24, wherein the forming step comprises forming an array of cube corner elements, which array includes the geometric structure.

28. (Withdrawn) The method of claim 27, wherein at least some of the cube corner elements are canted and arranged in opposing orientations.

29. (Withdrawn) The method of claim 24, further comprising forming at least one reference mark in at least one of the two substrates.

30. (Withdrawn) The method of claim 24, wherein the grooved side surfaces extend along axes that are parallel to a common plane.

31. (Withdrawn) The method of claim 24, wherein the providing step comprises:  
providing a first substrate;  
forming a plurality of faces in a first surface of the first substrate; and  
forming a second substrate over the plurality of faces as a replica.

32. (Withdrawn) The method of claim 31, wherein the forming a plurality of faces in the first surface comprises forming at least two intersecting sets of parallel v-shaped grooves.

33. (Withdrawn) The method of claim 24, wherein the step of forming grooved side surfaces produces discrete pieces of one of the two substrates on the other substrate, the method further comprising the step of:

removing at least some of the discrete pieces to expose portions of the internal interface.

34. (Withdrawn) The method of claim 24, further comprising the step of:  
replicating the geometric structure to form retroreflective sheeting.

35. (Withdrawn) The method of claim 24, wherein the step of forming grooved side surfaces comprises the step of forming a plurality of geometric structures selected from the group consisting of three-sided geometric structures and four-sided geometric structures.

36. (Withdrawn) A method of making a structured surface article comprising a geometric structure having a plurality of faces, the method comprising the steps of:

forming a plurality of faces in a first surface of a machined substrate;  
forming a replicated substrate of the machined substrate to form a compound substrate;  
forming a plurality of faces in a second surface of the machined substrate opposite the first surface; and  
removing selected portions of the machined substrate to form a geometric structure having at least a first face disposed on the machined substrate and at least a second face disposed on the replicated substrate.

37. (Withdrawn) The method of claim 36, wherein the geometric structure is one of a plurality of geometric structures each comprising a cube corner element, at least some of the cube corner elements being arranged in opposing orientations.

38-39 (Cancelled).

40. (Previously Presented) A compound substrate, comprising:  
a structured surface including a replicated substrate portion and a machined substrate portion embedded in the replicated substrate portion, the compound substrate further comprising at least one compound face including a substantially planar surface having a first face portion on the machined substrate portion of the compound substrate and a second face portion on the replicated substrate portion of the compound substrate, the first and second face portions being on opposite sides of a transition line.

**EVIDENCE APPENDIX**

None.

**RELATED PROCEEDINGS APPENDIX**

Appeal No. 2007-2987 decision attached.

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES

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*Ex parte* GERALD M. BENSON  
and KENNETH L. SMITH

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Appeal 2007-2987  
Application 09/515,978  
Technology Center 1700

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Decided: November 30, 2007

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Before CHARLES F. WARREN, THOMAS A. WALTZ, and  
CATHERINE Q. TIMM, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

DECISION ON APPEAL

Applicants appeal to the Board from the decision of the Primary Examiner finally rejecting claims 16 through 23 and 40 in the Office Action mailed April 13, 2004. 35 U.S.C. §§ 6 and 134(a) (2002); 37 C.F.R. § 1.191(a)(1) (2003); *see also* 37 C.F.R. § 41.31(a) (September 2004).

We affirm the decision of the Primary Examiner.

Claims 16, 20, and 40 illustrate Appellants' invention of a compound substrate, and are representative of the claims on appeal:

16. A compound substrate comprising a substantially replicated substrate having a structured surface and a discontinuous machined substrate covering only a portion of the structured surface, the compound substrate also comprising at least one geometric structure comprising a cube corner element that has at least one face disposed on the replicated substrate and at least another face disposed on the machined substrate.

20. A compound substrate comprising a substantially replicated substrate and a machined substrate, the replicated substrate having a structured surface and the machined substrate disposed in discrete pieces on the structured surface [sic] each of the replicated and machined substrates having an exposed surface that defines a face of a cube corner element on the compound substrate.

40. A compound substrate having a structured surface comprising a substantially replicated portion and a machined portion, the compound substrate further comprising at least one compound face thereon wherein the at least one compound face has a substantially planar surface having a first face portion on the machined portion of the compound substrate and a second face portion on the substantially replicated portion of the substrate, the first and second face portions being on opposite sides of a transition line.

The Examiner relies upon the evidence in these references (Answer 3):

Bacon, Jr. (Bacon)	5,614,286	Mar. 25, 1997
Nilsen	5,657,162	Aug. 12, 1997

Appellants request review of the grounds of rejection under 35 U.S.C. § 102(b) advanced on appeal: claim 40 as anticipated by Bacon; and claims 16 through 23 and 40 as anticipated by Nilsen. Br. 3; Ans. 3 and 5.

Appellants argue independent claims 16, 20, and 40 with dependent claims 17 through 19, 21, and 22 standing or falling with their respective independent claims. Br. 3. Thus, we decide this appeal based on claims 16,

20, and 40.<sup>1</sup> 37 C.F.R. § 1.192(c)(7)(2004); *see also* 37 C.F.R. § 41.37(c)(1)(vii)(September 2004).

The principal issues in this appeal are whether the Examiner has carried the burden of establishing a *prima facie* case of anticipation in each of the grounds of rejection advanced on appeal.

With respect to claim 40, the Examiner explains in graphic detail that the conformable cube corner retroreflective sheeting illustrated in Bacon's Fig. 1 is a compound substrate having a structured surface of "discrete cube corner segments (substrate and discontinuous substrate with faces)" comprising replicated and machined substrates providing a compound face with a transition line between the two face portions, wherein a face portion is provided by each of the replicated and machined portions. The Examiner finds that the structural features of the conformable cube corner retroreflective sheeting illustrated in Bacon's Fig. 1 meet the limitations of claim 40. Ans. 4 (emphasis omitted). With respect to claims 16, 20, and 40, the Examiner explains in graphic detail that the retroreflective article with multiple prisms illustrated in Nilsen's Fig. 2 is a compound substrate having a structured surface of a replicated substrate that has "a solid cube corner microprism (substrate with faces) coated with a discontinuous metallic layer

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<sup>1</sup> We do not separately consider claim 23 with respect to the second ground of rejection. With respect to this ground, Appellants state "Claims 20-23 stand or fall together" and then state that Nilsen fails to disclose a structural element "made by replication of the compound substrate of claim 20" as specified in claim 23. Br. 3 and 6. The Examiner, noting the inconsistent positions, addresses only independent claim 20, thus holding "argument regarding claim 23 . . . moot." Ans. 11. In the Reply Brief, Appellants state "[t]he grouping of claims set forth in the Appeal Brief is correct" and do not dispute the Examiner's determination that dependent claim 23 stands or falls with independent claim 20. Reply Br. 2.

(discontinuous substrate with faces . . . )” as a machined substrate, wherein a microprism comprises a cube corner element that has one face disposed on the replicated substrate and another face disposed on the machined substrate, with the respective faces of the compound face separated along a transition line. The Examiner finds that the structural features of the retroreflective article with multiple prisms illustrated in Nilsen’s Fig. 2 meet the limitations of claims 16, 20, and 40. Ans. 5-6 (emphasis omitted).

Appellants submit that the references do not anticipate the claims because neither reference discloses a “machined substrate.” Br. 5-7. Appellants contend Bacon’s sheet “is a microreplicated sheet” that has “no machined surfaces.” Br. 5, citing Bacon col. 3, l. 65 to col. 4, l. 33, col. 6, l. 64 to col. 7, l. 15, and col. 13, l. 13 to col. 14, l. 42. Appellants contend “Nilsen also fails to disclose a machined substrate.” Br. 5, citing Nilsen col. 2, ll. 35-45, and col. 3, ll. 7-19.

Appellants submit the claim terms “machined substrate” and “machined portion” impart structural limitations as the terms are used in the Specification, and thus, “it is clear that the compound substrates of claims 16-22 and 40 . . . are different from the replicated surfaces of either Nielsen or Bacon.” Br. 3-5; *see also* Br. 5-7. Appellants contend the term “[m]achined” is used to describe a surface that results when material has been physically removed from a blank to form the desired substrate or surface,” pointing out that a number of different machining processes using different material removal means are disclosed in the Specification. Br. 4, citing Spec. 9:1-12 and 9:26 to 10:5. Appellants contend that different material removal means impart different surface features to the substrate which “makes it impossible to generically define the surfaces in purely

structural terms.” Br. 4. Appellants contend “the structure implied by a seeming process term should be considered in assessing patentability where the product can only be defined by the process steps by which it is made or where the process steps would be expected to impart distinctive structural characteristics to the final product,” citing process terms such as, among other things, “welded” and “press fitted.” Br. 4.

Appellants submit “that a machined substrate and a replicated substrate are structurally different from one another.” Br. 4. Appellants contend “a machined substrate has surface features that result when the material is removed from the blank” and “the surface of a machined substrate has a crystal structure that is the same as the balance of the substrate.” Br. 4. Appellant contends “[a] replicated substrate . . . is a negative reproduction of a pre-existing surface” and “has a different crystal structure than that of the balance of the substrate.” Br. 5.

Appellants further contend with respect to claim 40, that “a transition line . . . separates the machined portion from the replicated portion of the substrate.” Br. 7. In this respect, Appellants contend Bacon’s “reference numeral 50 represents the side walls of discrete replicated cube corner segments” and “[s]ince there are no machined substrates or portions in Bacon, Bacon cannot have a transition line.” Br. 7. Similarly, Appellants contend “the joinder of metallic deposit 30A to the prism 50” in Nilsen’s Fig. 2 “does not provide a transition line that separates the machined and replicated features.” Br. 7.

The Examiner responds that in view of the claim terms “machined substrate” and “machined portion,” claims 16, 20, and 40 are drawn in product in product-by-process format, and in this respect, are given their

broadest reasonable interpretation in light of the Specification. Ans. 7. The Examiner contends these terms have not been defined by Appellants in the Specification and thus, “have been given their broadest reasonable interpretation of a substrate or portion made by a machine.” Ans. 7 and 8. The Examiner contends the passages of the Specification relied on by Appellants to provide a definition of “machined substrate/portion” instead “discuss several different processes that end in the same ‘machined substrate/portion’ which results in a discontinuous cube corner structure.” Ans. 8-9. The Examiner determines claims 16, 20, and 40 do not contain specific limitations on the method of making a “machined substrate” or “machined portion.” Ans. 8.

The Examiner contends Appellants’ arguments with respect to the structural differences between a machined substrate and a replicated substrate do not point out how the respective substrates differ, stating only “that the machined and replicated substrates are made by a different process.” Ans. 9. The Examiner contends that a reasonable interpretation “of the claimed invention in light of the specification is a compound substrate comprising a continuous substrate, i.e., the replicated substrate, with a structured surface and a discontinuous substrate, i.e., the machined substrate, covering a portion . . . [of] the structured surface of the continuous substrate,” wherein “[t]he compound substrate further comprising at . . . [least one] corner element that has at least one face disposed on the continuous substrate and another face disposed on the machined substrate.” Ans. 9-10.

The Examiner contends Bacon’s cube corner retroreflective sheeting is made with a mold and thus, by a machine, providing “a machined

substrate/portion.” Ans. 7 and 10, citing Bacon col. 3, l. 65 to col. 4, l. 19. The Examiner contends Nilsen’s metallic layer is vacuum deposited or otherwise treated to selectively form transparent reflective metallic deposits on the surface of some of the microprisms, thus forming a metallic “machined substrate” on the microprism “replicated substrate.” Ans. 7 and 10, citing Nilsen col. 2, ll. 45-49.

The Examiner contends the claim term “transition line” as defined in the Specification “as a line or other elongated feature that separates constituent faces of a compound face,” and thus “is a line between the machined substrate face and the replicated substrate face,” which is found in the relied upon illustrated embodiments of Bacon and Nilsen. Ans. 12, citing Spec. 26:13-18 and 28:25-26.

Appellants reply that the claims cannot be anticipated by Bacon and by Nilsen because the references do not describe the presence of both a machined substrate/portion and a replicated substrate/portion. Reply Br. 3 and 4. In this respect, Appellants contend Bacon creates a structured surface by molding, which is a replication process, and the segments of the structured surface are subsequently created from that molded surface, with the result that “adjacent segments cannot be different from one another,” i.e., “one cannot be machined and other replicated.” Reply Br. 3. Appellants contend that thus, Bacon’s structured surface is “either all machined or all replicated,” and points out that the Examiner’s position is that the structured surface is created by a “machine.” Reply Br. 3. Appellants further contend Nilsen’s vapor deposited metallic layer on portions of the structured surface replicates that surface, and is not machined. Reply Br. 3-4.

The issues framed by the Examiner and Appellants entail the interpretation of independent claims 16, 20, and 40 by giving the terms thereof the broadest reasonable interpretation in their ordinary usage in context as they would be understood by one of ordinary skill in the art, in light of the written description in the Specification unless another meaning is intended by Appellants as established therein, and without reading into the claim any disclosed limitation or particular embodiment. *See, e.g., In re Am. Acad. of Sci. Tech. Ctr.*, 367 F.3d 1359, 1364 (Fed. Cir. 2004); *In re Hyatt*, 211 F.3d 1367, 1372 (Fed. Cir. 2000); *In re Morris*, 127 F.3d 1048, 1054-55 (Fed. Cir. 1997); *In re Zletz*, 893 F.2d 319, 321-22 (Fed. Cir. 1989).

Each of claims 16 and 20 specify any manner of “compound substrate” comprising at least any substantially *replicated substrate* having any manner of “structured surface” having a “cube corner element,” and any manner of *machined substrate* that discontinuously covers only any portion of the “structured surface” of the *replicated substrate*, including discrete pieces of a *machined substrate* on the “structured surface” of the substantially *replicated surface*. In claim 16, the “compound substrate” further comprises at least any manner of a “geometric structure” comprising at least a “cube corner element” having one “face” disposed on the *replicated substrate* and another “face” deposited by the *machined substrate*. In claim 20, an exposed surface of each of the *replicated substrate* and the *machined substrate* defines a “face” of a “cube corner element” on the “compound substrate.”

Claim 40 specifies any manner of “compound substrate” having any “structured surface” comprising at least any substantially *replicated portion*, any manner of *machined portion*, and any manner of at least one “compound

face” having a substantially planar surface. The “compound face” has a first “face portion” on the *machined portion* and a second “face portion” on the substantially *replicated portion*, and the first and second “face portions” are on opposite sides of a *transition line*.

In the Specification, the term “compound substrate” is defined as “a substrate formed from a machined substrate having a structured surface and a replicated substrate (collectively referred to as ‘layers’) bonded along at least a portion of the interface with the machined substrate” and “[o]ne or more of the layers of the compound substrate may be discontinuous.” Spec. 26:19-22. The term “structured surface” is defined as “a surface that has a plurality of distinct faces arranged at various orientations.” Spec. 28:19-20. The term “cube corner element” is defined as “a set of three faces that cooperate to retroreflect light or to otherwise direct light to a desired location,” wherein “[s]ome or all of the faces can be compound faces;” and as “a set of three faces that itself does not retroreflect light or otherwise direct light to a desired location, but that is copied (in either a positive or negative sense ) in a suitable substrate forms a set of three faces that does retroreflect light or otherwise direct light to a desired location.” Spec. 26:25-27; *see also* 1:19-22; *cf.* 28:1-8 and 3:23 to 4:5. The term “compound face” is defined as “a face composed of at least two distinguishable faces (referred to as ‘constituent faces’) that are approximate each other” and “substantially aligned with one another.” Spec. 26:13-15. The term “face” is defined as “a substantially smooth surface.” Spec. 27:16. The term “geometric structure” is defined as “a protrusion or cavity having a plurality of faces.” Spec. 27:17. The term “structured” is defined as “when used in connection with a surface means a surface that has a plurality of distinct

faces arranged at various orientations.” Spec. 28:19-20. The term “transition line” is defined as “a line or elongated feature that separates constituent faces of a compound face.” Spec. 28:25-26.

In each of claims 16, 20, and 40, the compound substrate comprises at least a structured surface provided by a “machined substrate” layer having any manner of structured surface by definition and claim language, and a structured surface provided by a “replicated substrate” layer having any manner of structured surface by claim language. The claim language and definitions limit the “structured surface” of the respective substrates to the extent that a face of a cube corner element and a face of a compound face is provided by each of a “machined substrate” layer and a “replicated substrate” layer, each face being a substantially smooth, that is, planar, surface to any extent. The “machined substrate” layer must be discontinuous by claim language in claim 16 and can be discontinuous in claims 20 and 40 by definition. We find no claim limitation or definition in the Specification limiting the material of any specified “substrate” layer, and thus, the substrate material must be capable of providing such “structured surface” layers when “machined” and/or “replicated.” We consider the terms “replicated portion” and “machined portion” in claim 40 in the same manner as the terms “replicated substrate” and “machined substrate” in claims 16 and 20.

The claim terms “machined” and “replicated” indicate mechanical processing, as Appellants point out, but the claims do not contain any process step limitation(s) on such processes, as the Examiner points out. We determine that the term “machined” does not connote a particular result as does “welding” wherein two pieces of metal are joined by heating, forming a

weld joint. As Appellants point out, the term “machined” is used in the Specification in the structure forming sense of “to cut” material from a substrate, which is part of its ordinary dictionary meaning of “[t]o cut, shape, or finish by machine.”<sup>2</sup>

We find the term “replicated” is used in the Specification in the structure modifying sense of making one structured surface by duplicating another structured surface. Thus, this term has the ordinary dictionary meaning of “to duplicate, copy, reproduce, or repeat.”<sup>3</sup> We notice that it is well known that a structure of one substrate surface can be replicated in a second substrate by, e.g., machining methods, such as cutting, as well as other duplicating methods, such as molding. Indeed, molding is a form of “shaping” a substrate as is cutting, and molding methods can be performed by a variety of machines including a mold, a press, and an embossing roller. In this respect, the thus “replicated” surface results from a “machined” substrate. Furthermore, as the Examiner points out, there is no requirement in any claim language or definition that the structured surface layers as “machined” and as “replicated” must be structurally different in any respect. Indeed, we find no basis in the claim language or in the Specification which supports Appellants’ contentions that the “machined” and “replicated” substrate layers can be distinguished on the basis of the crystallinity of the resulting substrate.

We further do not find in the claim language or definitions in the Specification any requirement that the formation of the structured surface of

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<sup>2</sup> See, e.g., **machined**, *The American Heritage Dictionary of The English Language* 1047 (4th ed., Boston, Houghton Mifflin Company, 2000).

<sup>3</sup> See, e.g., **replicated**, *The American Heritage Dictionary of The English Language* 1480 (4<sup>th</sup> ed., Boston, Houghton Mifflin Company, 2000).

the “machined substrate” layer and that of the “replicated substrate” layer must be connected to any extent. Indeed, we find no basis in the claim language or in the disclosure in the Specification to read the illustrative embodiments in the Specification into the claims as limitations. *See, e.g., Zletz*, 893 F.2d at 321-22.

The claim term “transition line” in claim 40 is, by definition, a line or elongated feature that separates at least two distinguishable constituent faces of a compound face on the compound substrate, wherein one face or “face portion” is on a “machined portion” layer and a second face or “face portion” is on a “replicated portion” layer and thus, on opposite sides of the “transition line.” There is no definition of the “elongated feature” in the Specification or specified in the claim, and thus the same can be a gap or groove between the two otherwise approximate and substantially aligned faces of the compound face. Indeed, claim 40 requires that the constituent faces of the compound face are located on different layers which must necessarily have a line or elongated feature therebetween.

Accordingly, on this record, we determine, as a matter of law, that claims 16, 20, and 40 encompass a product characterized by the process by which it is made because of the claim terms “machined substrate” and “replicated substrate.” *See, e.g., In re Thorpe*, 777 F.2d 695, 696-97 (Fed. Cir. 1985), and cases cited therein. Therefore, applying the broadest reasonable construction to the terms of the claims in light of the Specification, the claimed compound substrates encompassed by claims 16, 20, and 40 include compound substrates with at least two layers which can be prepared by machining in any manner a substrate to obtain a “machined substrate” or “machined portion” layer having a specified “structured

surface” and by replicating in any manner a structured surface onto a substrate to obtain a specified “replicated substrate” or “replicated portion” layer, wherein the “structured surface” and the materials of the respective substrate or portion layers can be the same or different.

We find Bacon would have described to one skilled in this art, with reference to Fig. 1, conformable cube corner retroreflective sheeting 10 having a plurality of discrete cube corner segments 12 conformably bonded together, wherein each cube corner segment 12 comprises a plastic body portion 14 having side walls at 50 with at least one cube corner retroreflective element 20 defining cube corner point side 22. Bacon, e.g., col. 2, l. 59 to col. 3, l. 41, col. 6, l. 44 to col. 7, l. 55, and Fig. 1. The cube corner segments 12 are defined by a pattern of separations at 50 such as a plurality of contiguous polygons selected from, among other things, triangles and hexagons, and “[e]ach cube corner retroreflective element 20 comprises a plurality of (e.g., three) . . . faces . . . defined in part by a plurality of microreplicated grooves 32.” Bacon, e.g., col. 3, ll. 42-45, col. 6, l. 64 to col. 7, l. 4, and Fig. 1. The conformable cube corner retroreflective sheeting 10 can be made using a tool providing a molding surface and pressing heated thermoplastic sheeting onto the molding surface to form a plurality of cube corner segments 12 and dividing the molded sheet into a plurality of segments 12 by forming sidewalls 50. Bacon, e.g., col. 4, ll. 41-65, and col. 13, l. 13 to col. 14, l. 42.

We find Nilsen would have described to one skilled in this art, with reference to Fig. 2, a retroreflective article with multiple size prisms 50 on solid microprism formation 26, formed by molding, are pattern metallized on side facets, that is, faces, 40 of prisms 50, such as by vacuum

metallization or printing, to form discontinuous metal coatings 30A-B, leaving some prisms 50 uncoated. Nilsen, e.g., col. 1, ll. 42-60, col. 2, ll. 35-50, col. 3, ll. 7-19, col. 3, l. 36 to col. 4, l. 14, col. 4, ll. 35-40, and Fig. 2. “The microprisms 26 are closely spaced and can be described as cube corner formations.” Nilsen col. 2, ll. 60-61.

We find Appellants acknowledge in the Specification that direct machining techniques, in which a “series of grooved side surfaces are formed in the plane of a planar substrate,” have “the ability to accurately machine very small cube corner elements,” wherein “a large number of individual faces are typically formed in a continuous motion of the cutting tool,” are known in the art. Spec. 2:23 to 3:11.

There is no dispute that each of Bacon and of Nilsen in fact describe articles having cube corner elements and compound faces which correspond to the structure elements of the structured surface of a compound substrate article as claimed, in the manner graphically shown by the Examiner in the Answer. *See above* pp. 3-4. Upon comparing the claimed compound substrate article encompassed by claims 16, 20, and 40, as we interpreted these claims above, with the descriptions of compound substrate articles in Bacon and Nilsen relied upon, we agree with the Examiner that *prima facie* as a matter of fact the claimed and reference articles reasonably appear to be identical in all claim elements. *See, e.g., In re Schreiber*, 128 F.3d 1473, 1477 (Fed. Cir. 1997); *In re Spada*, 911 F.2d 705, 708 (Fed. Cir. 1990). Thus, the burden is shifted to Appellants to patentably distinguish the claimed articles by the submission of affective argument and/or objective

evidence. *See, e.g., In re Best*, 562 F.2d 1252, 1255-56 (CCPA 1977);<sup>4</sup> *In re Skoner*, 517 F.2d 947, 950-51 (CCPA 1975); *cf. Spada*, 911 F.2d at 708-09.<sup>5</sup>

Appellants' contentions that the claimed articles distinguish over the prior art articles by reason of the specified "machined" method by which at least one layer of the claimed article is formed, and thus, of a "transition line" between "machined" and "replicated" layers, are not supported by sufficient argument or evidence. Indeed, Appellants do not establish that the "replicated" layers of Bacon and of Nilsen and the patterned, discontinuous metal layer of Nilsen cannot be prepared by machining, such as by known direct machining techniques, or otherwise have different surface structures and/or other characteristics than exhibited by layers that are "machined."

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<sup>4</sup> Where, as here, the claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes, the PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his claimed product. *See In re Ludtke*, [441 F.2d 660 (CCPA 1971)]. Whether the rejection is based on "inherency" under 35 U.S.C. § 102, on "prima facie obviousness" under 35 U.S.C. § 103, jointly or alternatively, the burden of proof is the same, and its fairness is evidenced by the PTO's inability to manufacture products or to obtain and compare prior art products. [Footnote and citation omitted.]

*Best*, 562 F.2d at 1255.

<sup>5</sup> The Board held that the compositions claimed by Spada "appear to be identical" to those described by Smith. While Spada criticizes the usage of the word "appear," we think that it was reasonable for the PTO to infer that the polymerization by both Smith and Spada of identical monomers, employing the same or similar polymerization techniques, would produce polymers having the identical composition.

*Spada*, 911 F.2d at 708.

*See, e.g., Spada*, 911 F.2d at 708-09; *Thorpe*, 777 F.2d at 696-97; *Best*, 562 F.2d at 1255-56; *Skoner*, 517 F.2d at 950-51. Indeed, with respect to claim 40, in Bacon, each cube corner segment 12 with sidewalls 50 is a separate layer and all such layers form the compound substrate article 10. In this respect, the sidewalls 50 of adjacent segment 12 layers constitute a “transition line” where sidewall 50 is formed along groove 32, separating faces of a cube corner retroreflective element 20 that are in the respective surfaces of the adjacent segment layers 20, as the Examiner contends. Thus, the adjacent segment layers 12 appear to be identical and, on this record, can reasonably be “machined” or “replicated.”

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of anticipation found in Bacon and in Nilsen with Appellants’ countervailing evidence of and argument for non-anticipation and conclude that the claimed invention encompassed by appealed claims 16 through 23 and 40 would have been anticipated as a matter of fact under 35 U.S.C. § 102(b).

The Primary Examiner’s decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv) (2007).

AFFIRMED

tf/lis

Appeal 2007-2987  
Application 09/515,978

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